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Borel

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[54] **ENERGIZED IN-LINE ROLLER SKATE**

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[73] Assignee: **Salomon S.A.**, Metz-Tessy, France

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[51] **Int. Cl.**[6] **A63C 17/06**

[52] **U.S. Cl.** **280/11.22**; 280/11.19; 36/115

[58] **Field of Search** 280/11.19, 11.22, 280/11.23, 11.27, 11.28; 36/50.5, 88, 89, 109, 115, 117, 118, 119.1, 128, 122

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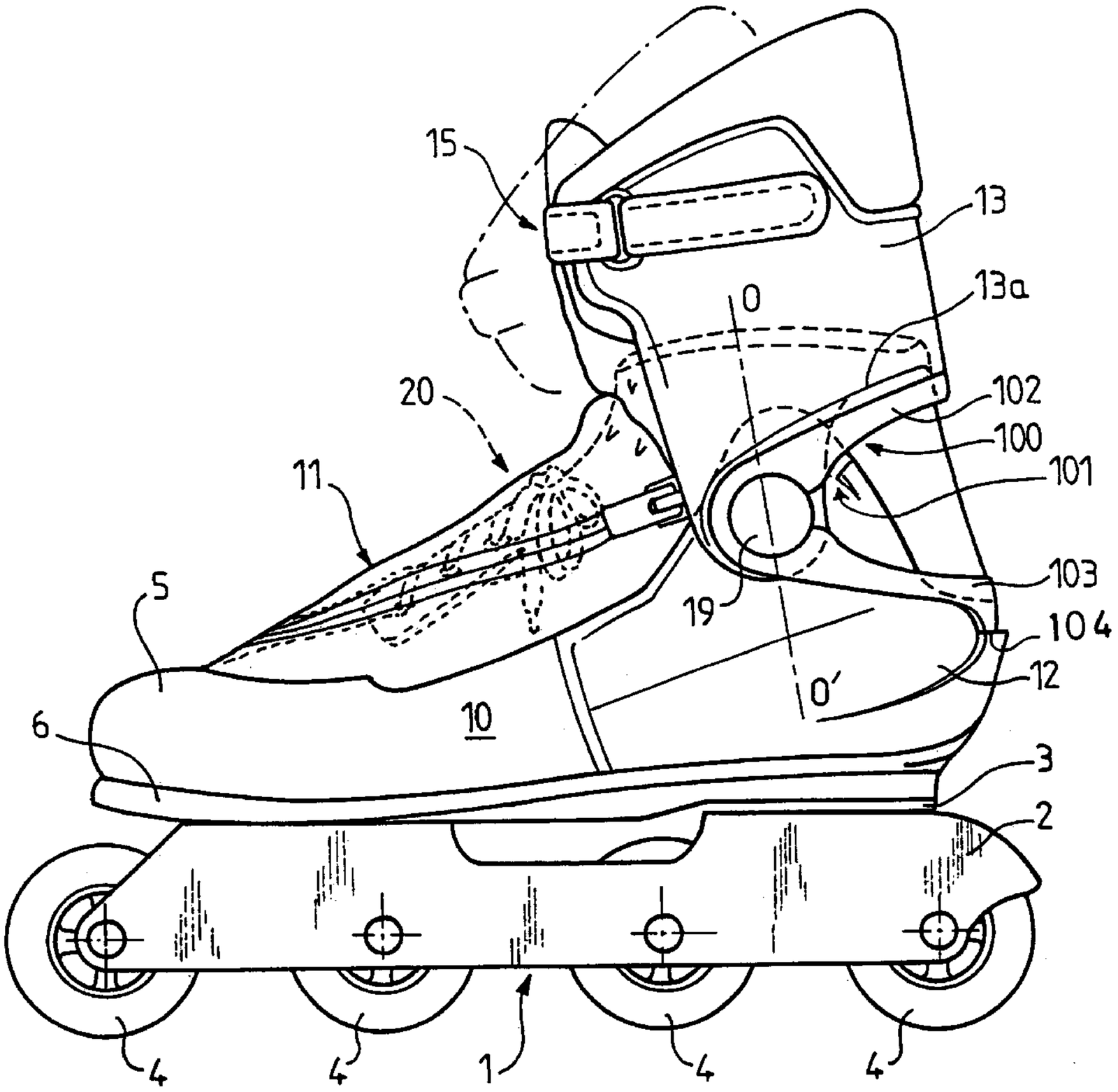
Primary Examiner—Richard M. Camby
Attorney, Agent, or Firm—Greenblum & Berstein P.L.C

[57] **ABSTRACT**

In-line roller skate equipped with an energization device including a boot whose sole is associated with an upper plate of a frame on a lower portion of which the skating wheels are arranged. The boot has a low upper provided with a rigid rear stiffener on which an equally rigid collar is journalled and capable of surrounding the user's ankle, and of pivoting about the journal to act against the elastic return device interposed between an upper and the collar, wherein these elastic return device is biased at least during pivoting toward the rear of the collar, from a substantially vertical, median inactive position of equilibrium, and along an angular travel limited in amplitude by a rear limit stop of the collar arranged fixedly on a portion of the upper, or on a corresponding portion of the collar, so as to provide an at least forward elastic return of the collar, depending on an energy the value of which is proportional to the angular travel of the upper, within a maximum limit determined by the position of the limit stop of the collar.

34 Claims, 5 Drawing Sheets



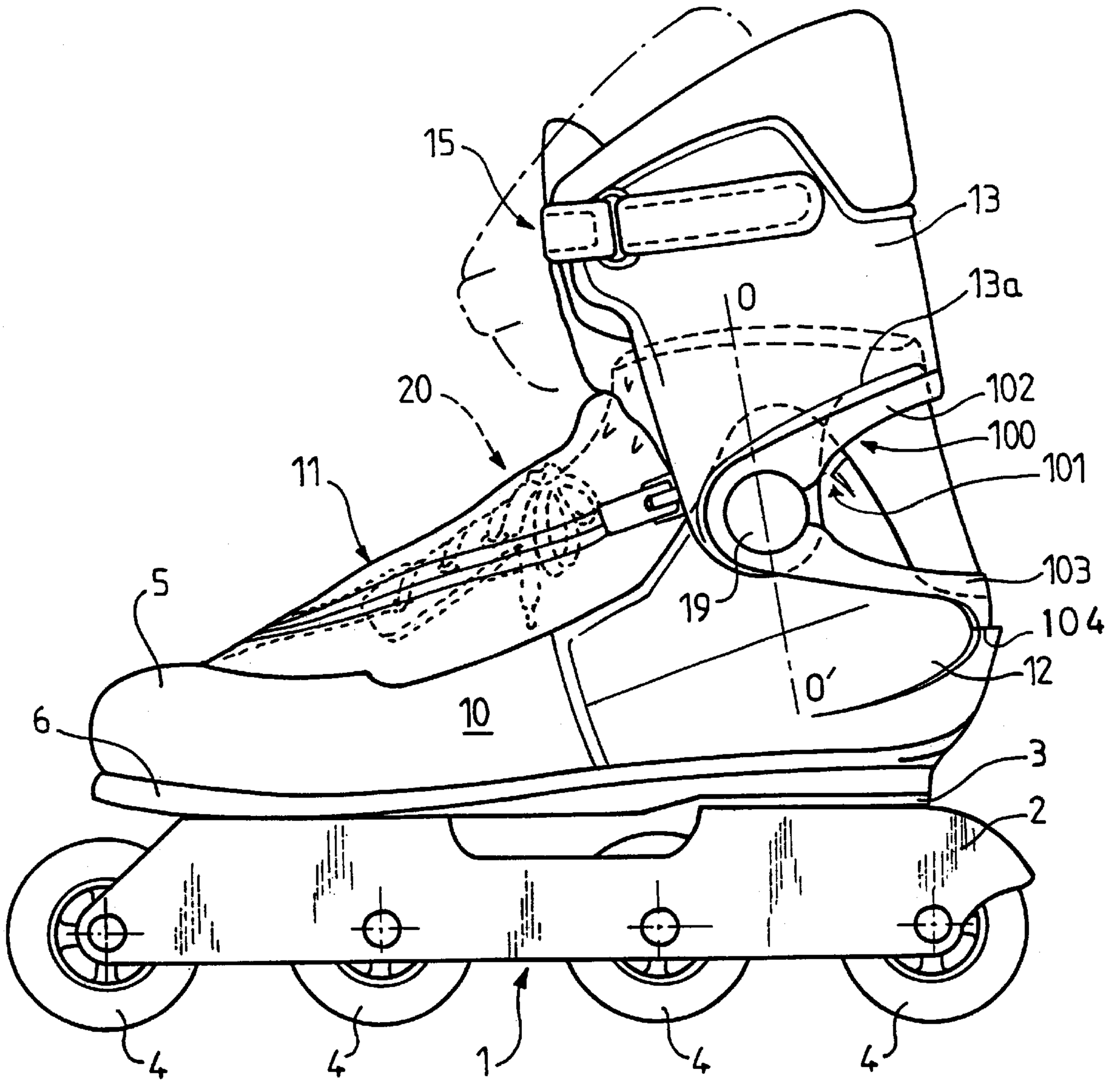


FIG. 1

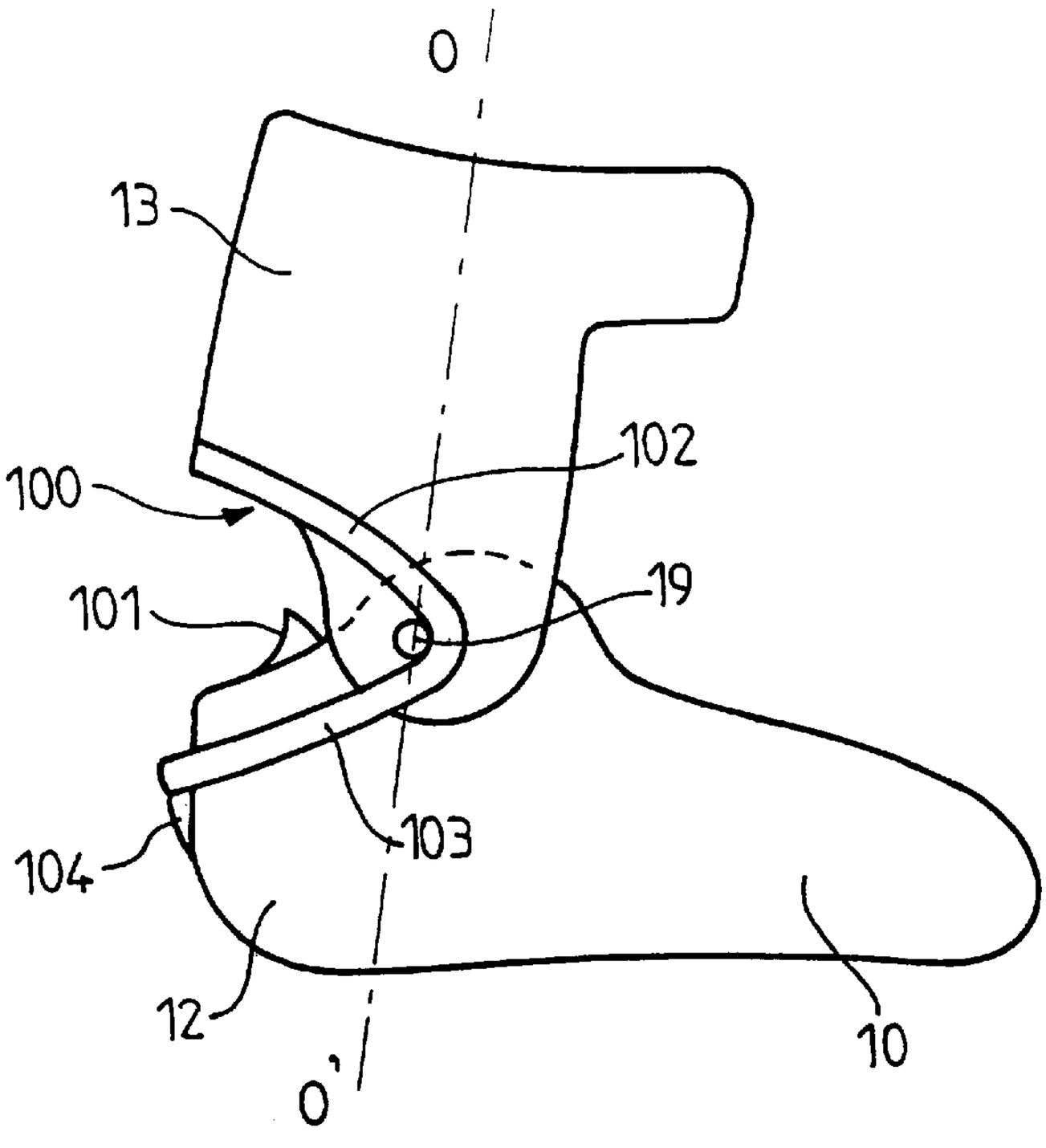

0
13
100
102
101
19
103
104
12
0'
10

FIG. 2

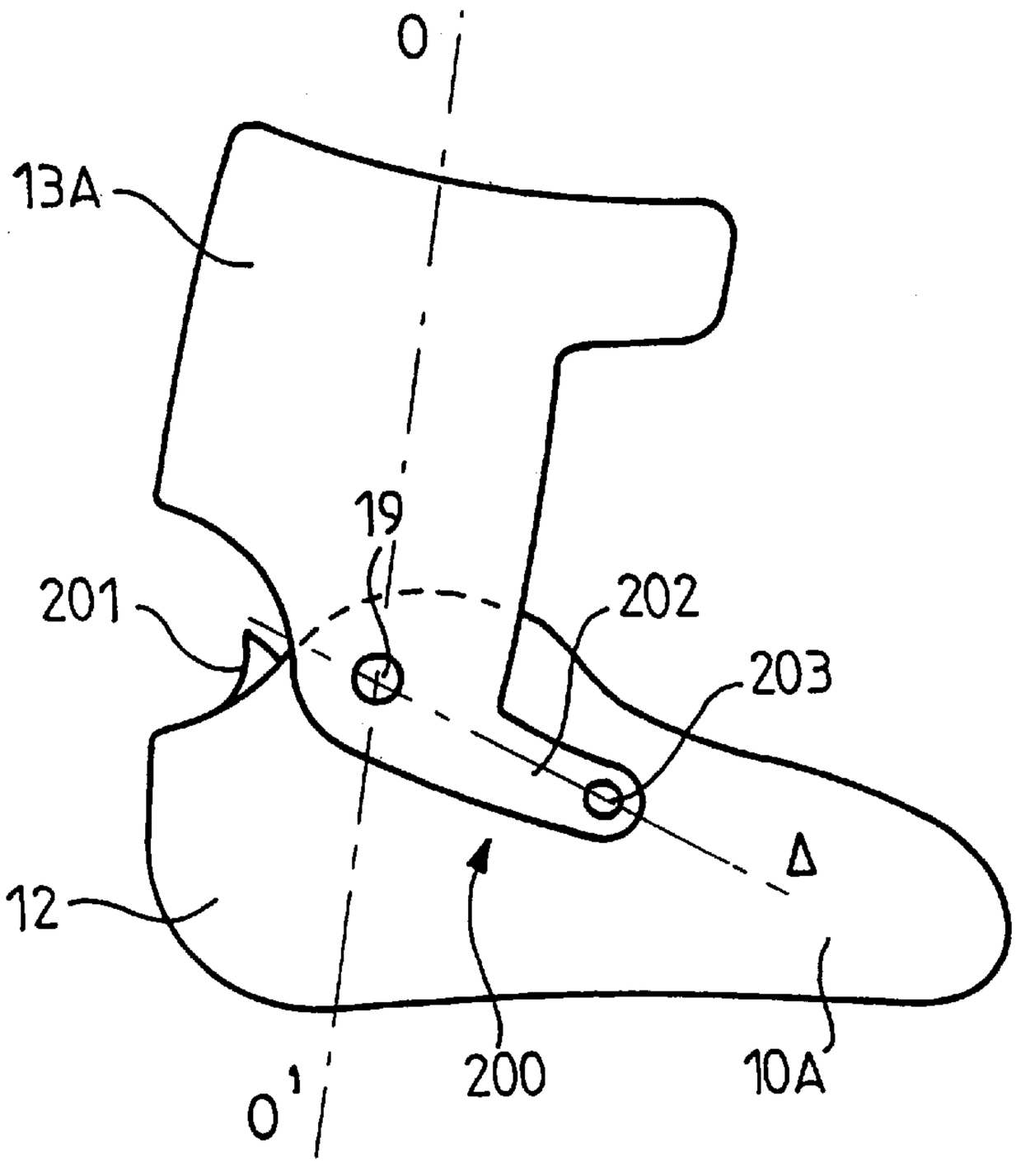

0
13A
19
201
202
203
Δ
12
200
10A
0'

FIG. 3

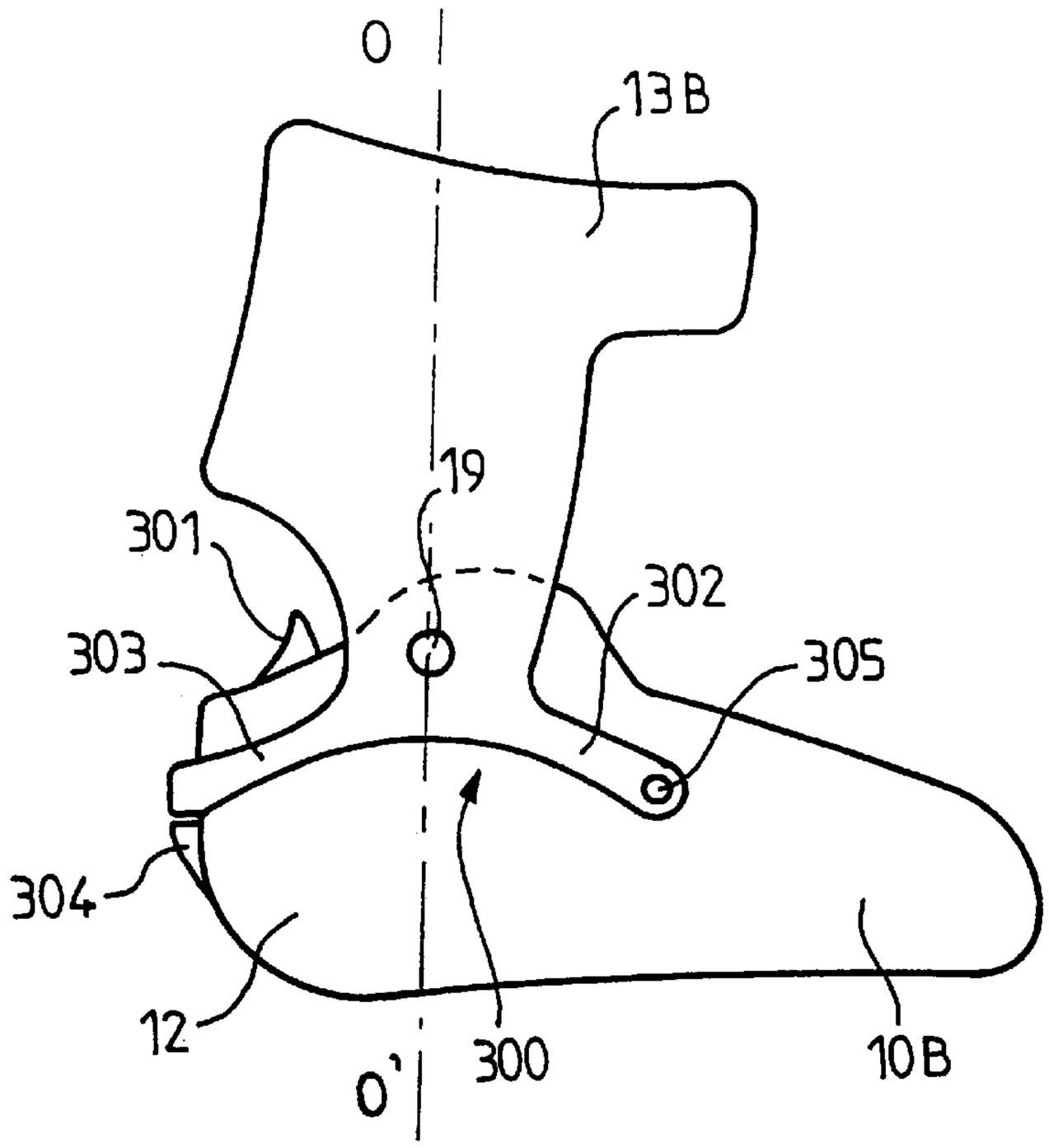

O
13B
19
301
302
303
305
304
12
O'
300
10B

FIG. 4

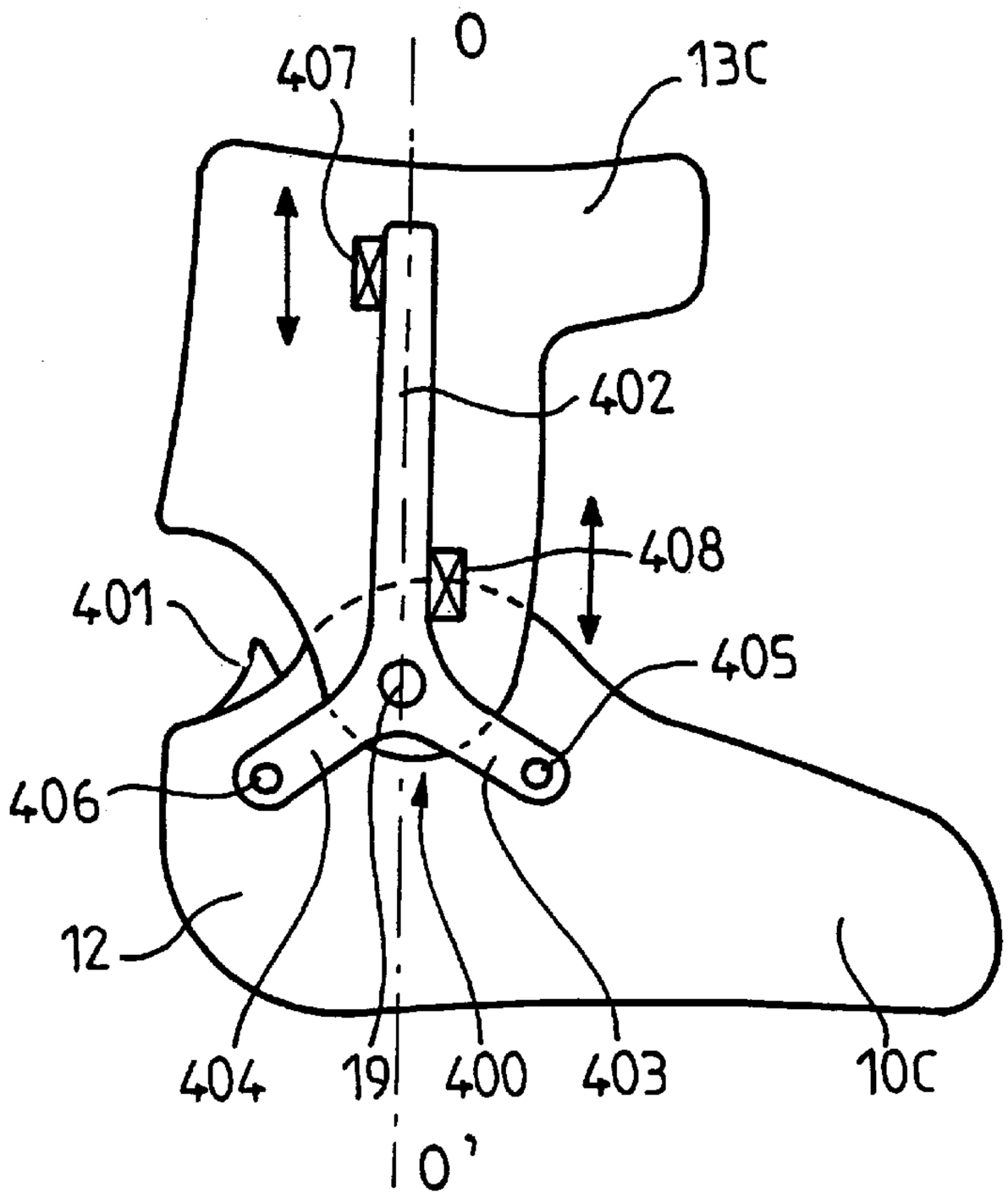

O
407
13C
402
408
401
405
406
12
404
19
400
403
10C
O'

FIG. 5

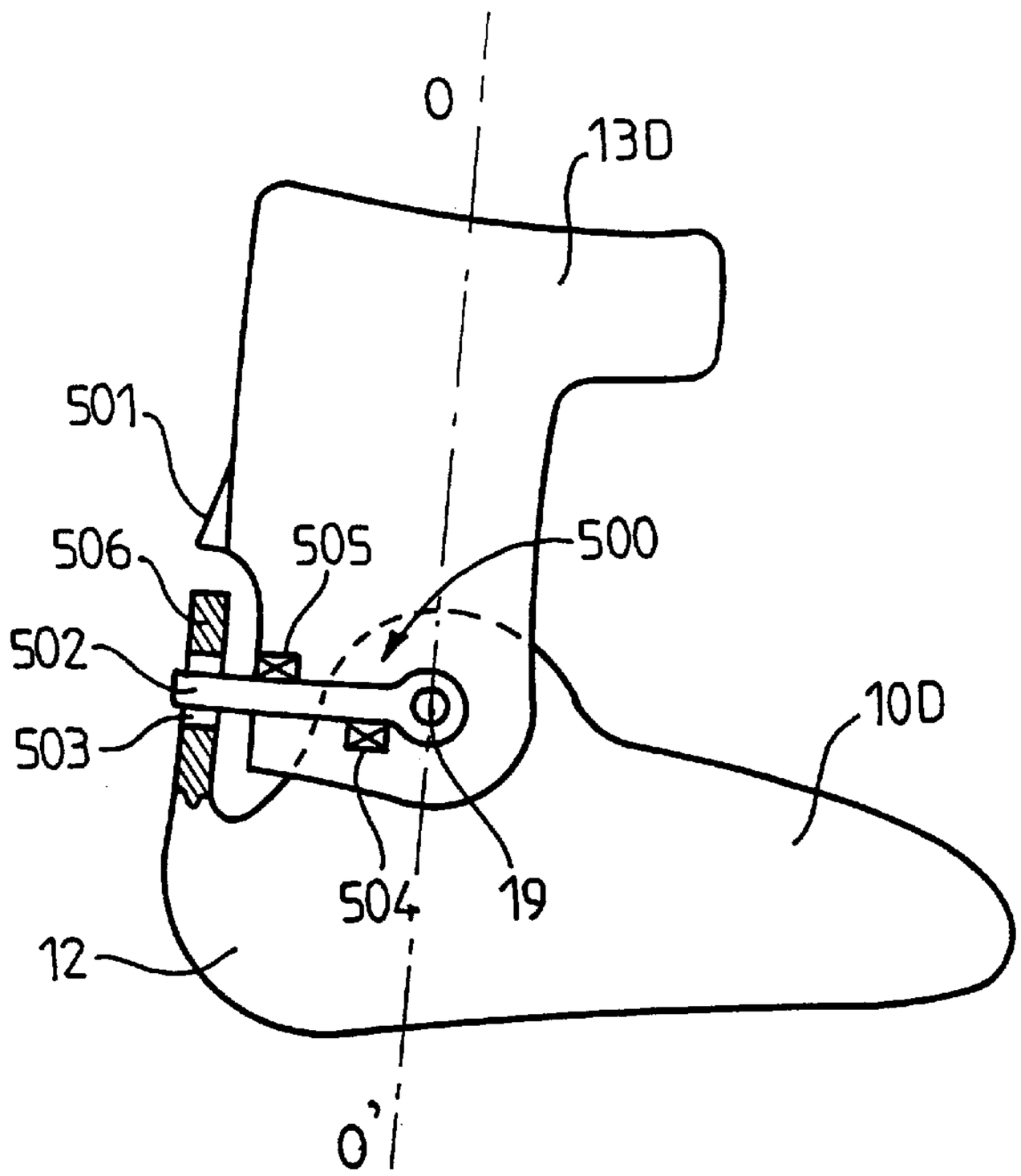

0
13D
501
506
505
500
502
503
10D
504
19
12
0'

FIG. 6

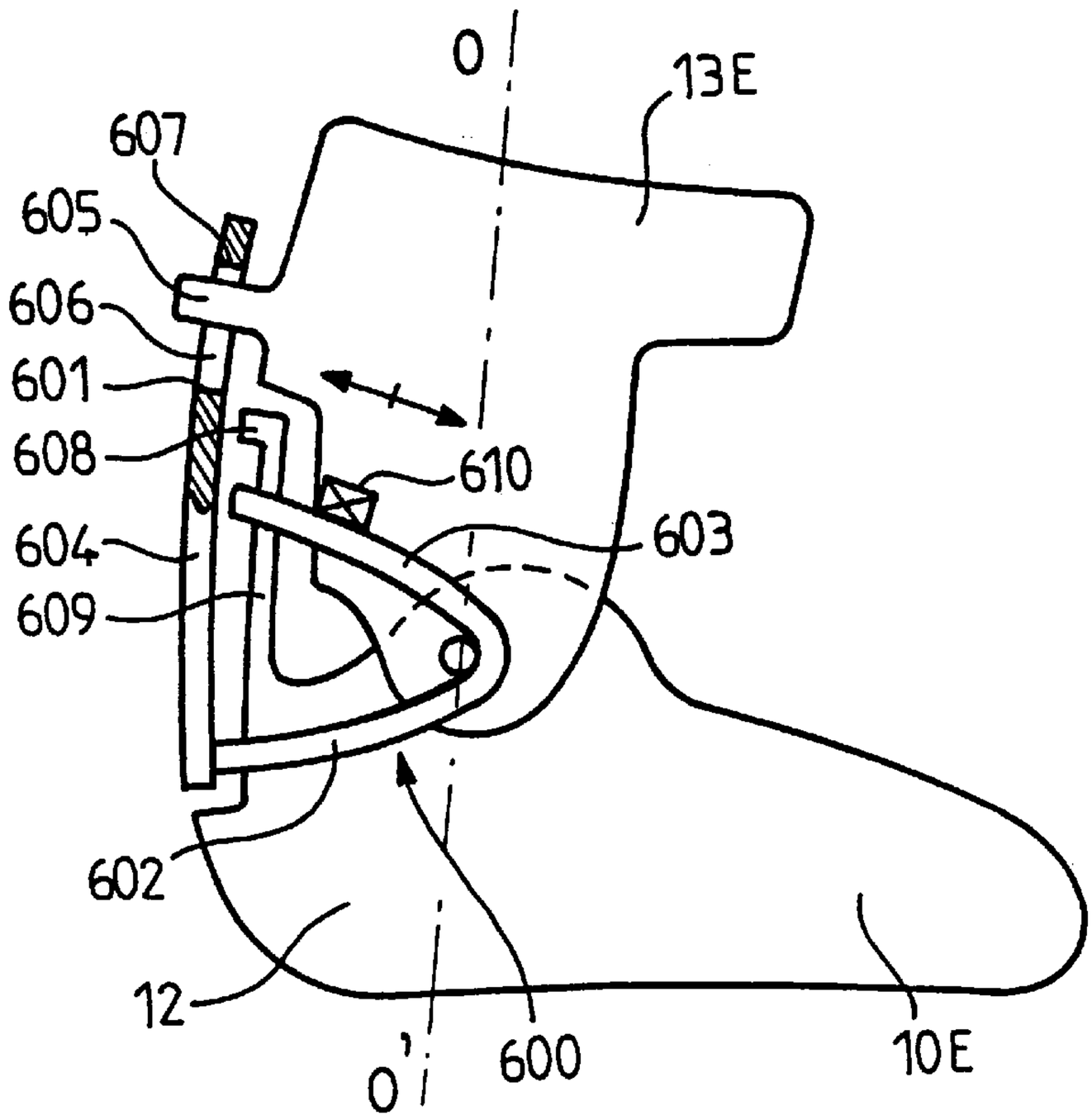

0
13E
607
605
606
601
608
610
603
604
609
602
12
0'
600
10E

FIG. 7

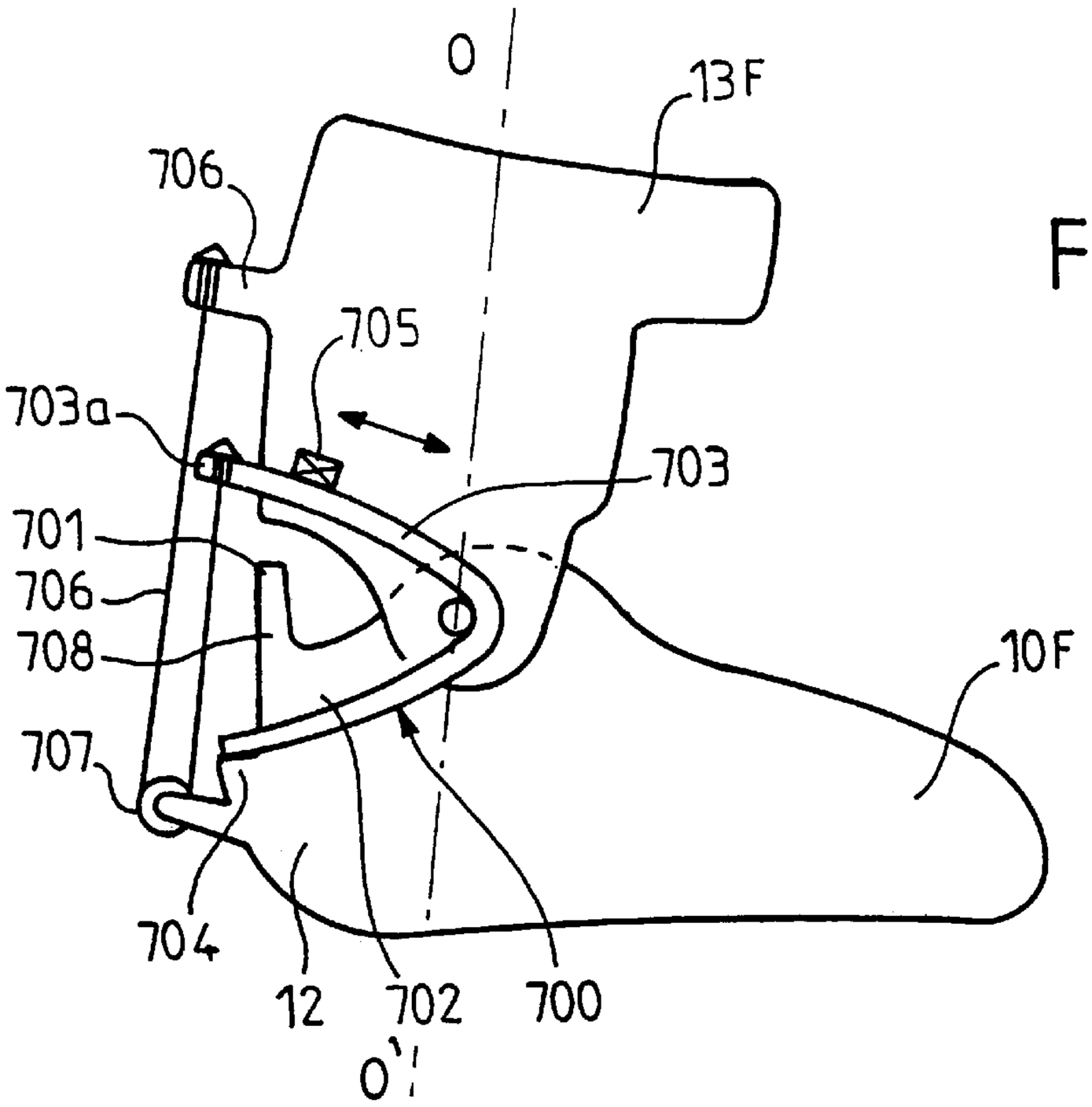

0
13F
706
705
703a
703
701
706
708
10F
707
704
12
702
700
0'

FIG. 8

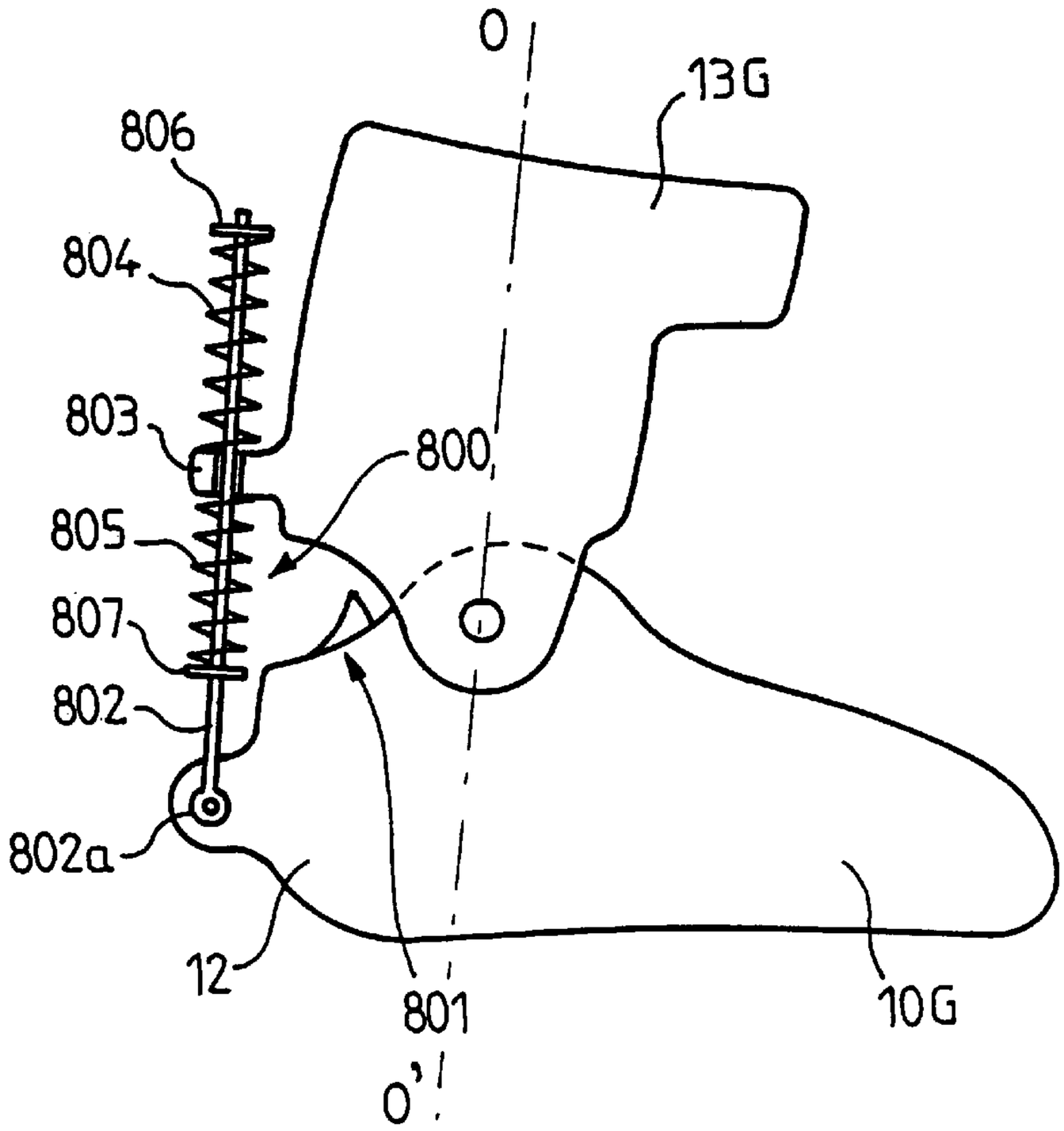

0
13G
806
804
803
800
805
807
802
802a
12
801
10G
0'

FIG. 9

ENERGIZED IN-LINE ROLLER SKATE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an in-line type roller skate including a boot whose sole is associated with an upper plate of a frame on a lower portion of which the skating wheels are arranged, the boot including a low upper provided with a rigid rear stiffener on which an equally rigid collar is journalled and capable of surrounding the user's ankle and of pivoting freely about the journal.

2. Background and Material Information

The aforementioned type of skate constitutes a sport in itself, and can also be adapted for the practice of skaters on ice, outside of a skating rink, but also for any athlete eager to maintain or perfect, on a tarred hard ground, cement floor, etc., techniques that are used in gliding sports, such as trail skiing, cross country skiing, ice skating, etc.

In this type of sport, it has quickly become necessary to have an energizing device capable of assisting the muscles in certain skating phases, as is already known in cross-country ski boots, for example.

Thus, it is known, in a cross-country ski boot, to energize a collar toward the rear with respect to a boot upper, via elastic return means interposed between the upper and the collar, but without limiting the amplitude. However, depending on the user's experience, control of this amplitude, therefore of the energization of the collar, is not always easily managed by the user.

Moreover, it has been noted that the control of a rear energization of the collar is essentially reserved for highly experienced skaters, and that for beginners to intermediate skaters, it is important to have an energized rear and front support, as well as a rear abutment capable of limiting the travel of the collar with respect to the upper.

Likewise, this is indispensable for a proper use of a brake when the skate is equipped therewith.

It is in view of these facts and considerations that the invention was envisioned.

SUMMARY OF THE INVENTION

The invention relates to an in-line roller skate including a boot whose sole is associated with an upper plate of a frame on a lower portion of which the skating wheels are arranged, the boot including a low upper provided with a rigid rear stiffener on which an equally rigid collar is journalled and capable of surrounding the user's ankle, and of pivoting freely about the journal to act against an elastic device interposed between the upper and the collar, wherein this elastic device is biased at least during pivoting toward the rear of the collar, from a substantially vertical, median inactive position of equilibrium, and along an angular travel limited in amplitude by a rear limit stop of the collar arranged fixedly on a portion of the upper, or on a corresponding portion of the collar, so as to provide an at least forward elastic return of the collar, depending on an energy the value of which is proportional to the angular travel of the upper, within a maximum limit determined by the position of the limit stop of the collar.

Furthermore, the rear limit stop is particularly important for the proper use of a brake controlled by the rearward rocking of the user's ankle.

According to another characteristic of the invention, the elastic return device is biased during a pivoting toward the rear or the front of the collar, from the substantially vertical, median inactive position of equilibrium.

BRIEF DESCRIPTION OF DRAWINGS

The invention is also related to the characteristics which will become apparent along the following description, and which must be considered separately or according to all of their possible technical combinations.

This description, provided by way of a non-limiting example, will help to better understand how the invention can be embodied, with reference to the annexed drawings in which:

FIG. **1** is a side view of an in-line roller skate according to a first example of embodiment of the invention;

FIG. **2** schematically shows a boot according to FIG. **1**;

FIG. **3** schematically shows a boot according to an alternative embodiment;

FIG. **4** schematically shows a boot according to an alternative embodiment;

FIG. **5** schematically shows a boot according to an alternative embodiment;

FIG. **6** schematically shows a boot according to an alternative embodiment;

FIG. **7** schematically shows a boot according to an alternative embodiment;

FIG. **8** schematically shows a boot according to an alternative embodiment;

FIG. **9** schematically shows a boot according to an alternative embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The skate shown in FIG. **1** is constituted by a frame **1** having a U-shaped cross-section and constituted by two lateral flanges **2** on which the wheels **4** are fixed, and by a mounting plate **3** on which the boot **5** is attached through its sole **6**.

The boot **5** has the external aspect of a normal low boot, and is therefore constituted by a low flexible upper **10**, i.e., an upper whose rigid portions do not extend upwardly beyond the malleoli, the upper being provided on its front portion with an opening **11** for passage of the foot and with a closure system **20** of a known type, for closure of the boot and tightening of the foot.

The upper **10** is provided in the heel area with a rigid rear stiffener **12** that can be made in any known manner and in fact constitutes the only rigid portion of the upper.

This stiffener **12** is preferably made of a rigid synthetic material and extends over the entire rear portion of the boot, around the heel thereof.

This stiffener **12** extends, in the malleoli zone, up to the top of the upper for receiving a journalled collar **13**, and has, on the outside, at the level of these malleoli, an outwardly projecting boss that extends substantially perpendicularly to the wall of the stiffener.

Of course, the collar **13** could also be mounted in a different manner while allowing an easy dismounting, for example by means of a bayonet or ratchet system that is known in itself and is not described hereinafter, for the replacement of the collar or the utilization of the boot with a simple low upper.

The journalled collar **13** is constituted by a cuff made of a rigid material, and in particular of a synthetic material such as that known by the commercial name Pebax.

This collar **13** extends upwardly to the lower part of the calf and surrounds the entire lower part of the leg. It is open at its front portion to enable the positioning of the foot in the boot, and is provided with tightening means **15** of a known type and is constituted, for example, by self gripping means.

This collar **13** is further provided at the rear with a scallop **13***a* adapted to facilitate the rearward rotation of this collar.

As can be conceived easily, the substantial height of the collar **13** enables an excellent lateral leg retention during skating, such a height further allowing for a greater distribution of the reaction forces on the leg, and therefore a better comfort for the user.

However, this height of the collar **13** does not hinder the front/rear bending movements of the leg with respect to the foot, and can even be increased, for example, until halfway up to the leg so as to decrease the forces on the leg.

According to the invention, the in-line roller skate **1** shown in FIG. **1** includes an elastic return device or means **100** interposed between the upper **10** and the collar **13**.

This device, according to the invention and generally speaking, are biased at least during a rearward pivoting of the collar **13** from a substantially vertical, median inactive position of equilibrium **00'**, and along an angular travel limited in amplitude by a limit stop **101** fixedly arranged on a portion of the upper **10**, or on a corresponding portion of the collar **13**, so as to obtain an at least forward elastic return thereof, according to an energy whose value is proportional to the angular travel of the upper within a maximum limit determined by the position of the stop **101**.

In this case, the elastic return device **100** is inactive in the median position of equilibrium **00'** of the collar **13** toward the front.

Still according to FIG. **1**, the elastic return device **100** is constituted by a double pin having an upper arm **102** and a lower arm **103**, respectively in abutment with the collar **13** and a rear support abutment **104** arranged on the upper **10**, the pin **102–103** being biased only during a rearward pivoting of the collar **13**.

The pin further passes around the journal **19** of the collar **13** in order to be maintained in place.

In this case, the forward pivoting of the collar is totally free, whereas its rearward pivoting is exerted against the elastic member **100** which, on the contrary, facilitates the return toward the front of the collar.

Of course, the elastic return member **100** could be obtained in any other way, as long as it exerts a return force on the collar during a rearward pivoting thereof. For example, it could be a different type of spring, a coil spring, an elastic buffer, etc. This elastic member could also be conceived to be integral with one of the elements of the upper, and could thus be constituted by an elastic arm extending from the journalled upper and cooperating with an abutment provided on the rear stiffener, or another portion of the upper **10**. Conversely, it could also be an elastic arm extending from the rear stiffener of the upper and cooperating with an associated abutment of the collar.

In any event, such an arrangement tends to assist the leg muscle which controls the lifting of the tip of the foot with respect to the leg, and therefore makes it possible to limit the fatigue of the muscle during practice of the sport.

Another important advantage of this elastic return member is that it provides the leg of the athlete with a kind of rear support having a progressive resistance, and in particular that it provides the athlete with a rearward referencing of the position of his leg, i.e., it enables him to locate the position

of his leg with respect to the vertical, which information is particularly important for maintaining balance in such a gliding sport.

Finally, the provision of a rear limit stop for the collar **13** is particularly important for proper use of a brake controlled by the rearward rocking of the user's ankle.

Of course, the present invention is not limited to the examples of embodiment described hereinabove, but encompasses all similar or equivalent embodiments.

Thus, the embodiments of FIGS. **3–9**, the elastic return means **200**, **300**, **400**, **500**, **600**, **700**, **800**, respectively, are also biased during pivoting, not only rearward but also forward pivoting of the collar **13**A–**13**G from the substantially vertical, median inactive position of equilibrium **00'** shown in these Figure.

More particularly, according to the example of embodiment of FIG. **3**, the elastic device **200** is constituted by an energy leg **202** extending from the rigid collar **13**A and extending beyond its journal **19** on the upper **10**A in the direction of its front portion, the end of the leg **202** being affixed to the latter to constitute a support point **203** both during a rearward pivoting and a forward pivoting, in order to energize the leg by a value that is identical in both directions.

This energization is in fact dependent upon the quantity of material used on both sides of a line Δ joining the two journals or affixation points **19**, **203**, and which is biased in compression during forward or rearward bending of the collar. If this quantity of material is for example more substantial beneath the line Δ, the compression force, and therefore the energization force, will be more substantial toward the rear than toward the front.

According to the same example, a rear limit stop **201** for the collar **13**A is arranged on a portion of the rear stiffener **12**, opposite a corresponding portion of the collar **13**A.

According to the example of FIG. **4**, the elastic return device **300** is constituted, on the one hand, by a first energy leg **302** extending from the rigid collar **13**B and extending beyond its journal **19** on the upper **10**B in the direction of its front portion. The end of the leg **302** is affixed to this upper **10**B to constitute a support point **305**, during both a rearward and forward pivoting of the collar **13**B in order to energize such a leg **302** by a value that is identical in both directions. On the other hand, the elastic return device is constituted by a second energy leg **303** which also extends from the rigid collar **13**B and extends beyond the same journal **19**, in the direction of its rear leg, the end of the second energy leg **303** being free in angular movement, such that during a rearward pivoting of the collar **13**B, the leg **303** meets a rear support abutment **304** of the upper **10**B to cause energization, during a rearward pivoting of the collar **13**B, of the second leg **303**, this energy being added to that provided by the first leg **302**.

Such a construction makes it possible to add energization toward the rear, in addition to that which is already provided toward the front, and therefore makes it possible, with simple means, to have a higher energy ratio toward the rear. This ratio will be dependent upon the type of user and could be, for example, on the order of 1–4.

According to the same example, a rear limit stop **301** is arranged on a portion of the rear stiffener **12**, opposite a corresponding portion of the collar **13**B.

In the two embodiments shown in FIGS. **3** and **4**, the energy legs **202**, **302**, **303**, can be made integral with the collar **13**A, **13**B, as shown, or can be attached, which results in collar in a more flexible material allowing for a better

enveloping of the calf, the energy legs then being made of a stiffer and elastic material.

According to the example of FIG. **5**, the elastic return device **400** is constituted by an energy bar **402** extending freely in a substantially vertical direction, laterally to the collar **13**C, from its journal and toward its upper portion, the bar **402** forming at its lower portion, from the same journal **19**, two diverging legs **403** and **404**, one leg **403** toward the front of the upper **10**C, and the other leg **404** toward the rear, the two legs **403** and **404** being affixed to the upper to constitute a front support point **405** and a rear support point **406**, so as to energize the bar **402** during forward and rearward pivoting of the collar **13**C, via a front energy abutment **407** which cooperates with the energy bar **402** during forward bending of the collar **13**C, and via a rear energy abutment **408** which cooperates with the energy bar **402** during rearward bending, these two abutments being arranged on the collar **13**C on both sides of the bar **402**.

The front **407** and rear **408** energy abutments are preferably adjustable in position along the bar **402** as a function of the desired values for front or rear energization.

Furthermore, a rear limit stop **401** is arranged on a portion of the rear stiffener **12**, opposite a corresponding portion of the collar **13**C. The front support point **405** could possibly be replaced by two abutments of the same type as the abutments **407** and **408**.

According to the example of FIG. **6**, the elastic return device **500** is constituted by an energy bar **502** extending freely in a substantially horizontal direction, laterally to the collar **13**D, from its journal **19** and toward the rear portion of the upper **10**D which includes a housing **503** through which the end of the bar **502** extends to take support upwardly and downwardly, as a function of a forward or rearward pivoting of the collar **13**D, the bar **502** being energized via a front energy abutment **504** and a rear energy abutment **505** arranged on the collar **13**D on both sides of such bar **502**, and cooperating with the bar **502**, respectively, during a forward or rearward pivoting of the collar **13**D.

Likewise, the front **504** and rear **505** energy abutments are adjustable along the bar **502** as a function of the desired values for front or rear energization.

Furthermore, a rear limit stop **501** is arranged on a rear portion of the collar **13**D, opposite a corresponding portion **506** of the rear stiffener.

According to the example of FIG. **7**, the elastic return device **600** is constituted by a double pin **602–603** including a lower arm **602** affixed to a lower end of a rod **604** extending at the rear of the collar **13**E with which it cooperates at its upper portion via a leg **605** that is capable of moving in a housing **606** of the rod **604** between a lower plane **601** constituting a rear limit stop and an upper plane **607** on which the leg **605** takes support during a front pivoting of the collar **13**E, such support movably driving the lower arm **602** of the pin, and therefore, its second upper arm **603** until the latter enters into contact with a front energy abutment **608** obtained on a vertical extension **609** of the rear stiffener **12**, from which moment the pin **602–603** is subjected to compression for a forward energization. The rearward energization also occurs by compression of the pin **602–603** obtained via a rear energy abutment **610** affixed to the collar **13**E and acting on the upper arm **603** of such pin until the leg **605** comes into contact with the rear limit stop **601**, constituted by the lower plane of the housing **606** for the rod **604**, for a value of maximum compression in rear energization.

Likewise, the rear energy abutment **610** is adjustable along the upper arm **603** as a function of the desired value for rear energization.

According to the example of FIG. **8**, the elastic return device **700** is constituted by a double pin **702–703** including a lower arm **702** that is free in forward angular movement and in rearward support against a rear support abutment **704** arranged on the stiffener **12** and against which the lower arm **702** is pressed during a rearward pivoting of the collar **13**F via a rear energy abutment **705** affixed to such collar **13**F and supported on the upper arm **703** of the pin to bias it in compression. The forward energization of the collar also occurs through a compression of the pin **702–703** by exerting a traction force on its upper arm **703**, with a forward pivoting of the collar **13**F, the lower arm **702** of the pin being into contact with the rear support abutment **704**, the traction occurring via a cable **706** connected to the end **703***a* of the upper arm **703**, on the one hand, and to an upper portion **706** of the collar **13**F via a return pulley **707** arranged on a rear portion of the stiffener **12** of the upper **10**F, on the other hand.

In this case, a rear limit stop **701** of the collar **13**F is obtained with an extension **708** of the upper **10**F in the direction of such collar **13**F.

According to the example of FIG. **9**, the elastic return device **800** is constituted by a rear rod **802** in linkage at its lower portion **802***a* with the rear stiffener **12** of the upper **10**G and freely extending through a substantially central zone, a protuberance **803** of the collar **13**G constituting a front or rear energy abutment, a first front energization spring **804** being arranged on the rod **802** at its upper portion, between the central protuberance **803** and an abutment **806** of the lower end of the rod **802**, whereas a second rear energization spring **805** is arranged on the rod **802** at its lower portion, between the central protuberance **803** and an abutment **807** of the upper end of the rod **802**. In this way, a forward pivoting of the collar **13**G compresses the first upper spring **804** for a front energization, while a pivoting of the collar **13**G compresses the second lower spring **805** for a rear energization.

In this case, the position of the protuberance **803** of the collar **13**G forming a front or rear energy abutment as well as the force and length of the spring **804** and **805** are defined as a function of the desired values for a front or rear energization.

Likewise, a rear limit stop **801** of the collar **13**G is obtained on a corresponding portion of the upper **10**G.

Of course, the present invention is not limited to the embodiments nor to the application to skate/in-line roller skate described, but also applies to all sporting goods adapted to resolve the same problems of retaining the foot/ankle, assisting the muscles, etc.

The invention could also apply to boots having completely rigid portions of the upper.

The instant application is based upon French Priority Patent Application No. 96.07030, filed on Jun. 4, 1996, the disclosure of which is hereby expressly incorporated by reference thereto, and the priority of which is hereby claimed under 35 U.S.C. §119.

What is claimed:

1. An in-line roller skate comprising:

a frame having an upper plate and a lower portion on which skating wheels are arranged; and

a boot comprising a sole affixed to said upper plate, an upper provided with a heel stiffener, and a rigid collar capable of supporting a user's ankle, a pivot connection pivotally connecting said rigid collar to said heel stiffener for movement of said rigid collar between a forwardmost position and a rearwardmost position, and elastic return means acting between said upper and said rigid collar;

said elastic return means being biased at least during a pivoting motion of said rigid collar toward the rear of the boot;

said boot further comprising a rear limit stop, arranged fixedly on said boot to limit rear pivoting amplitude of said rigid collar with respect to said heel stiffener, which provides a forward elastic return to said rigid collar according to an energy value proportional to angular travel of said rigid collar, within a maximal limit determined by the position of said limit stop of said rigid collar.

2. An in-line roller skate according to claim **1**, wherein:

said elastic return means comprises an elastic member made unitary with said rigid collar.

3. An in-line roller skate according to claim **1**, wherein:

said pivotal connection of said rigid collar furthermore effecting movement through a median position between said forwardmost position and said rearwardmost position; and

said elastic return means has a configuration, with respect to said rigid collar and said upper, for being biased only between said median position and said rearwardmost position of said rigid collar, said elastic return means being non-biased forwardly of said median portion, said median position constituting an inactive position of equilibrium.

4. An in-line roller skate according to claim **1**, wherein:

said elastic return means are constituted by a double pin comprising an upper arm and a lower arm, said upper arm being in abutment with said rigid collar and said lower arm being in abutment with a rear support abutment arranged on said upper;

said pivotal connection of said rigid collar furthermore effecting movement through a median position between said forwardmost position and said rearwardmost position; and

said double pin has a configuration, with respect to said rigid collar and said upper, for being biased only between said median position and said rearwardmost position of said rigid collar, said elastic return means being non-biased forwardly of said median portion.

5. An in-line roller skate according to claim **1**, wherein:

said pivotal connection of said rigid collar furthermore effects movement through a substantially vertical median position between said forwardmost position and said rearwardmost position; and

said elastic return means has a configuration, with respect to said rigid collar and said upper, for being non-biased in said median position of said rigid collar, said median position thereby constituting an inactive position of equilibrium.

6. An in-line roller skate according to claim **5**, wherein:

said elastic return means is constituted by an energy leg extending from said rigid collar and extending beyond said pivot connection on said upper in a forward direction to a front portion of said upper at an end of said energy leg, said end of said energy leg being affixed to said front portion of said upper to constitute a support point both during rearward pivoting and forward pivoting of said rigid collar in order to energize said energy leg in both forward and rearward pivoting.

7. An in-line roller skate according to claim **6**, wherein:

said rear limit stop is arranged on a portion of said heel stiffener, opposite a corresponding portion of said rigid collar.

8. An in-line roller skate according to claim **5**, wherein:

said elastic return means comprises a first energy leg extending from said rigid collar and extending beyond said pivot connection on said upper in a forward direction to a front portion of said upper at an end of said first energy leg, said end of said first energy leg being affixed to said front portion of said upper to constitute a support point both during rearward pivoting and forward pivoting of said rigid collar in order to energize said first energy leg in both forward and rearward pivoting;

said elastic return means further comprises a second energy leg extending from said rigid collar and extending beyond said pivot connection on said upper in a rearward direction to a rear portion of said upper at an end of said second energy leg, said end of said second energy leg being free in angular movement;

said boot further comprises a rear support abutment on said upper;

said second energy leg being positioned to engage said rear support abutment during angular movement of said second energy leg in a rearward direction to cause energization of said second energy leg, in addition to energization of said first energy leg.

9. An in-line roller skate according to claim **8**, wherein:

said rear limit stop is arranged on a portion of said heel stiffener, opposite a corresponding portion of said rigid collar.

10. An in-line roller skate according to claim **5**, wherein:

said elastic return means comprises an energy bar extending freely in a substantially vertical direction, laterally along said rigid collar, from said pivot connection to an upper portion of said energy bar, said energy bar having a lower portion forming, from said pivot connection, two downwardly extending diverging legs, a first of said diverging legs extending toward a front of said upper and second of said diverging legs extending toward a rear of said upper, said two diverging legs being affixed to said upper to constitute a front support point and a rear support point to energize said energy bar during forward pivoting and rearward pivoting of said rigid collar;

said boot further comprises a front energy abutment forward of said energy bar and a rear energy abutment rearward of said energy bar;

said energy bar being positioned to engage said rear energy abutment during rearward pivoting of said energy bar to cause energization of said energy bar and to engage said front energy abutment during rearward pivoting of said energy bar to cause energization of said energy bar.

11. An in-line roller skate according to claim **10**, wherein:

said front energy abutment and said rear energy abutment are movably affixed to said boot for selectively adjusting the magnitude of energization of said energy bar for each of said forward and rearward pivoting.

12. An in-line roller skate according to claim **11**, wherein:

said rear limit stop is arranged on a portion of said heel stiffener, opposite a corresponding portion of said rigid collar.

13. An in-line roller skate according to claim **5**, wherein:

said elastic return means comprises an energy bar extending freely in a substantially horizontal direction, laterally along said rigid collar, from said pivot connection to a rear portion of said upper, said rear portion of said

upper comprising a housing, said energy bar having an end portion extending through said housing, said energy bar being positioned for engagement with said housing upon a predetermined amount of pivoting of said rigid collar in rearward and forward directions, respectively;

said boot further comprises a front energy abutment and a rear energy abutment arranged on respective sides of said energy bar.

14. An in-line roller skate according to claim **13**, wherein:

said front energy abutment and said rear energy abutment are movably affixed to said boot for selectively adjusting the magnitude of energization of said energy bar for each of said forward and rearward pivoting.

15. An in-line roller skate according to claim **13**, wherein:

said rear limit stop is arranged on a portion of said heel stiffener, opposite a corresponding portion of said rigid collar.

16. An in-line roller skate according to claim **5**, wherein;

said elastic return means is constituted by a double pin comprising an upper arm and a lower arm;

said rigid collar comprises a rearwardly extending leg;

said skate further comprises a rod having a lower end affixed to said lower arm of said double pin and extending along a rear of said rigid collar, said rod having a housing within which said leg of said rigid collar extends, said housing being defined by a lower rod-engaging surface and an upper rod-engaging surface, said lower rod-engaging surface constituting said rear limit stop during rearward movement of said rigid collar;

said heel stiffener has a vertical extension with a front energy abutment;

said upper rod-engaging surface is engageable by said leg of said rigid collar during forward pivoting of said rigid collar and thereby driving said lower and upper arms of said double pin of said elastic return means until said upper arm engages said front energy abutment of said heel stiffener and subjecting said elastic return means to compression for forward energization;

said rigid collar having a rear energy abutment positioned thereon, said upper arm being positioned for engagement with said rear energy abutment during rearward pivoting of said rigid collar and thereby subjecting said elastic return means to compression for rearward energization until a maximum rearward energization occurs upon engagement of said leg of said rigid collar with said rear limit stop.

17. An in-line roller skate according to claim **16**, wherein:

said rear energy abutment is movably affixed to said boot along said upper arm for selectively adjusting the magnitude of energization of said energy bar for rearward pivoting of said rigid collar.

18. An in-line roller skate according to claim **5**, wherein:

said heel stiffener comprises a rear support abutment and said rigid collar comprises rear energy abutment;

said elastic return means is constituted by a double pin comprising an upper arm and a lower arm;

during rearward pivoting of said rigid collar said lower arm is in support against said rear support abutment and said rear energy abutment is supported against said upper arm of said double pin, whereby said double pin of said elastic return means is biased in compression during said rearward pivoting of said rigid collar;

said skate further comprises:

a return pulley arranged on a rear portion of said heel stiffener;

a cable connected to a rearward end portion of said upper arm, extending downwardly to said return pulley, and extending upwardly to an upper portion of said rigid collar;

during forward pivoting of said rigid collar said lower arm is in support against said rear support abutment, whereby said double pin of said elastic return means is biased in compression during said forward pivoting of said rigid collar by means of a traction force being exerted on said upper arm of said double pin via said cable.

19. An in-line skate according to claim **18**, wherein:

said rear limit stop is provided by means of an extension of said upper extending upwardly toward said rigid collar.

20. An in-line skate according to claim **5**, wherein:

said rigid collar comprises a rearwardly positioned protuberance constituting a front and a rear energy abutment;

said elastic return means comprises:

a rear rod having a lower end linked to said heel stiffener and extending upwardly, from a lower rod abutment, through a central zone, to an upper rod abutment;

a front energization spring arranged on an upper portion of said rod between said protuberance and said upper rod abutment;

a rear energization spring arranged on a lower portion of said rod between said protuberance and said lower rod abutment;

whereby forward pivoting of said rigid collar compresses said front energization spring for a front energization and rearward pivoting of said rigid collar compresses said rear energization spring for a rear energization.

21. An in-line skate according to claim **20**, wherein:

said protuberance is positioned on said rigid collar, and said springs have respective forces and lengths, as a function of predetermined magnitudes desired for said front and rear energizations.

22. An in-line skate according to claim **20**, wherein:

said rear limit stop is provided on a corresponding portion of said upper.

23. An in-line roller skate comprising:

a frame having an upper plate and a lower portion on which skating wheels are arranged; and

a boot comprising a sole affixed to said upper plate, an upper provided with a heel stiffener and a rigid collar capable of supporting a user's ankle, a hinge connection hingedly connecting said rigid collar to said heel stiffener for movement of said rigid collar between a forwardmost position and a rearwardmost position, and an elastic return device acting between said upper and said rigid collar;

said elastic device being arranged for biasing said rigid collar during pivotal motion of said rigid collar toward the rear of the boot;

said boot further comprising an abutment portion, arranged fixedly on said boot to limit rear pivoting amplitude of said rigid collar with respect to said heel stiffener, and to stop biasing of said elastic return device in a rear direction.

24. An in-line roller skate according to claim 23, wherein:

said elastic return device comprises an elastic member made unitary with said rigid collar.

25. An in-line roller skate comprising:

a frame having an upper plate and a lower portion on which skating wheels are arranged; and

a boot comprising a sole affixed to said upper plate, an upper provided with a heel stiffener, and a rigid collar capable of supporting a user's ankle, said rigid collar being pivotally connected to said heel stiffener, and an elastic return device acting between said upper and said rigid collar;

said elastic return device being biased at least during a pivoting motion of said rigid collar rearwardly from a median inactive position of said rigid collar to provide a forward elastic return force to said rigid collar, said elastic return device exerting an energy value proportional to a magnitude of rearward pivotal movement of said rigid collar;

said boot further comprising a rear limit stop, separate from said elastic return device, to limit rear pivoting amplitude of said rigid collar with respect to said heel stiffener, thereby defining a rearwardmost position of said rigid collar, said rear limit stop being arranged fixedly on said boot and, in all positions of said rigid collar forward of said rearwardmost position, said rear limit stop being spaced from a surface to be engaged with said rear limit stop.

26. An in-line skate according to claim 25, wherein:

said rear limit stop is affixed to said upper and is engaged by a part of said elastic return device upon rear pivoting of said rigid collar.

27. An in-line skate according to claim 25, wherein:

said rear limit stop is affixed to said upper and is engaged by a part of said rigid collar upon rear pivoting of said rigid collar.

28. An in-line skate according to claim 25, wherein:

said rear limit stop is affixed with respect to said elastic return device and is engaged by a part of said rigid collar upon rear pivoting of said rigid collar.

29. An in-line skate according to claim 25, further comprising:

a brake.

30. An in-line roller skate comprising:

a frame having an upper plate and a lower portion on which skating wheels are arranged; and

a boot comprising a sole affixed to said upper plate, an upper provided with a heel stiffener, and a rigid collar capable of supporting a user's ankle, said rigid collar being pivotally connected to said heel stiffener for movement between a forwardmost position and a rearwardmost position, and an elastic return device acting between said upper and said rigid collar;

said elastic return device being biased at least during a pivoting motion of said rigid collar rearwardly from a median inactive position of said rigid collar to provide a forward elastic return force to said rigid collar, said elastic return device exerting an energy value proportional to a magnitude of rearward pivotal movement of said rigid collar;

said boot further comprising a rear limit stop to limit rear pivoting amplitude of said rigid collar with respect to said heel stiffener, thereby defining said rearwardmost position of said rigid collar, said rear limit stop being arranged fixedly on said boot and, in all positions of said rigid collar forward of said rearwardmost position, said rear limit stop being spaced from a surface to be engaged with said rear limit stop.

31. An in-line skate according to claim 30, wherein:

said rear limit stop is affixed to said upper and is engaged by a part of said elastic return device upon rear pivoting of said rigid collar.

32. An in-line skate according to claim 30, wherein:

said rear limit stop is affixed to said upper and is engaged by a part of said rigid collar upon rear pivoting of said rigid collar.

33. An in-line skate according to claim 30, wherein:

said rear limit stop is affixed with respect to said elastic return device and is engaged by a part of said rigid collar upon rear pivoting of said rigid collar.

34. An in-line skate according to claim 30, further comprising:

a brake.

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